JACET Journal of Advances in Computer Engineering and Technology, 4(1) 2018

The Impact of the Adoption Business Intelligence among Iranian Banks

Marzieh Faridi Masouleh[1]

Received (2017-02-26)
Accepted (2017-12-14)

Abstract - **Business intelligent (BI) technologies have been adopted by different types of organizations. The banking sector is among the service industry that has been largely influenced by technology currently. This has been manifested in the way the operations of banking have evolved from the pure exchange of cheques, cash, as well as other negotiable platforms to the application of IT (information Technology) to transact business in this service industry. The study conducted on impacts of business technologies adoption among Iranian Banks revealed that the adoption has made banking industry in Iran to be competitive and have improved operational efficiencies. However, in terms of Risk reduction, BI technologies if not used appropriately it can lead to the downfall of these banks. BI solutions allow banking industry in Iran to use the available data to exploit the competitive advantage as well as have an improved understanding of the demands and needs of customers by facilitating effective communication.**

Keywords - **Business intelligent, improved operational efficiencies, improved customer retention, reduced risks, improved marketing, information technology, Iranian Banks, data.**

1- Science and Research Branch, Islamic Azad University, Tehran, Iran.(m.faridi@srbiau.ac.ir)

1. INTRODUCTION

Efficient internal processes greatly contribute to the success as well as the growth of an organization (Chen, et al., 2012). As an organization continues to grow, the amount of data that an organization utilizes also increases massively (CAIA & NĂSTASE, 2015). The collection and analysis of huge data quantities in most cases is a tedious process, especially if it is done in a traditional way. Lack of data availability at the right time in right form can cause a delay in decision-making process especially related to the given data (Elbashir, et al, 2014). Data is a valuable element to any organization. Information flow in an organization is important to its success and growth (Elbashir et al., 2013). Every organization struggle in retrieving information, collecting data, as well as making decisions depending on the extracted data (Williams & Williams, 2013).

A decision-making process comprises making a judgment about various investments as well as resources based on both qualitative and quantitative data. Organizations use a wide range of systems such as Enterprise Resource Planning, data warehouse, etc. in the decision-making process (Scholz et al, 2013). Such systems have progressed immensely in last decade by making a vast amount of information accessible using data warehouses and data marts. These systems enable managers to analyze data based on the requirements of the business (Rud, 2009). In addition, the systems have made decision-making process quite easy to a given level; however, if not employed effectively, they can avert optimization of the process of making a

decision. In any organization, decisions are made by human and not systems and due to this fact; data presentation plays a key role in decision-making process (Wang, 2014).

InformationandcommunicationsTechnologies have really change the mode through which most organizations and organizations currently transact business to meeting the ever-increasing demand of the clients/customers (Sharifi-Renani et al., 2014). The banking sector is among the service industry that has been largely influenced by technology currently. This has been manifested in the way the operations of banking have evolved from the pure exchange of cheques, cash, as well as other negotiable platforms to the application of IT (information Technology) to transact business in this service industry (Tavallaei, et al., 2015). According to (CHUNG-KUANG, 2013), the ICT's promise in the banking industry has been achieved in terms of its capacity to increase customer base, improving the quality as well as timeliness of responses, minimize the cost of transactions, facilitating service and self-service customization, enhancing opportunities for branding and advertisements, and enhance customer communication, as well as relationship (Taghavifard et al., 2012).

The BI concept has been attributed to assisting bodies tasked with making decisions in organizations to make factual decisions and effectively manage data (Peters et al., 2016). The popularity of BI is because of its capacity to mitigate risks as well as increase certainty amidst the current global economic turbulence (Tvrdíková, 2016). Nearly all businesses as well as organizations that have an interest in enhancing their decision-making process have thus embraced the BI concept and have integrated into amazing business processes (Shollo & Galliers, 2016). The banking industry, which in most cases manages a large amount of data, are also in the process of adopting the BI concept (Shollo & Galliers, 2016). Companies and businesses in this fast growing competitive world business require special tools and systems if they want to survive and thrive through this ever-increasing uncertainty (Gross & Solymossy, 2016). Such systems and tools include Business intelligent as well as other Management information systems similar to BI, demand management, predictive analytics, role modeling, and role-based intelligence (Peters et al., 2016).

Many organizations have implemented the BI concept as a process that converts data into meaningful information and afterward into knowledge (Rouhani et al., 2016). According to (Schulz et al., 2015), this concept is now common with businesses that want to add value to their decision-making process. This has thus made the application of BI in various Iranian Industries known and has recorded a drastic increase in the recent years. Currently, the use of Business intelligent concepts and process has been extended to the Iranian Banking sectors. Indeed, the BI systems and technologies emergence has prompted Iranian Banks to reassess their Information technology strategies to allow them to remain competitive in the global banking market (Han et al., 2016). The adoption of BI in Iranian banking industry is an issue that cannot be overstated. This is mainly because the BI technologies adoption, as well as application, are in fact a basic requirement for most international banks that Iran work for. This study, therefore, reports research findings into the impact of adopting BI on the Iranian Banking Industry.

The whole process for this study is formulated in the conceptual design model as indicated in figure 1. The research study was designed in five main phases, with most important deliverables of every phase, summarized in the boxes below:

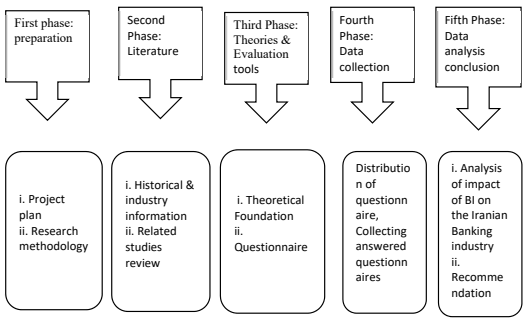

Fig 1: A summary of the whole research process

2. OBJECTIVES

• To find out how the adoption of BI by Iranian Banks has affected their operations.

• To find out whether BI technologies have been used by some Iranian Banks for wrong reasons.

3. HYPOTHESIS

1) Experimental Hypothesis: The adoptions of BI by Iranian banks has improved the efficiency by which they conduct their businesses and at the same time the BI technologies have been used by rogue managers to engage in unethical accounting practices.

2) Null Hypothesis: The adoption of BI technologies by Iranian Banks has increased the rate of accounting malpractices within these Banks.

4. Research Methodology

Research Approach

The study adopted the practical approached that allows the employment of at least two methods of data collection, results in presentation as well as data analysis. A qualitative method was used to gather secondary data. The sources of secondary data included peer-reviewed journals, articles, and books that have addressed the adoption of business intelligent by Iranian Banks and its related aspects including the level of Maturity of BI in Iranian Banking Industry. The study also used a quantitative approach to collect raw data (primary) from the respondents. This approached allowed for numerical data collection that would be utilized in conducting statistical analysis for determining the significance of the study. Tables with standard deviation and average percentages were employed to present the results of the study. For the testing of study hypothesis, the Analysis of Variance (ANOVA) was used as a descriptive tool. A deductive approach was used by the researcher in developing the experimental hypothesis. The developed hypothesis was tested using the collected numerical data from the study sample using quantitative approach.

The survey questionnaire

A cross-sectional survey questionnaire was administered to Bank managers, supervisors, and other banking staffs from a stratified cluster random sample of ten banks in Iran. The questionnaire was created by the researcher conducting a detailed literature review and identifying factors that might be associated with Iranian banks adopting BI technologies. Through multiple iterations, the framework provided the underpinning to create survey questions, which were then compared with the existing tools measuring the effects of BI adoption by other industries. The researcher used the Survey gizmo software to construct the final version of the questionnaire. The researcher then piloted the final questionnaire for use with 50 adults of at least 18-years from the general population. The piloted participants were selected from the banking top executives, supervisors, and other staffs. The selected participants varied with respect to position and gender. The questionnaire was piloted as well revised many times with the 50 people over three months until the participants accepted the questions and design layout out of the questionnaire and could complete it within 15 minutes. The researcher conducted the recruitment for the main survey in the selected Iranian Banks with each Bank preserved five slots. The Bank employees and managers were randomly selected from different departments. All the participants managed to fill in the survey questionnaire without any support or additional guidelines from the researcher. The researcher used Random-sampling technique in order to reduce any selection bias, with the researcher conducting recruitment on different days and times divided equally among the selected banks.

Population and Sampling

The sample generally represented the population Banking staffs and top official working for the selected Iranian Banks. The research targeted a maximum of 50 participants as the sample size. It included 30 males and 20 females. Probabilistic sampling approach was employed in order to give equal opportunities to all participants. The same questionnaire was distributed to each respondent, which were to be filled as per the questions provided. The survey questions were systematic in structure to guarantee that the information collected is indeed substantive as well as addresses the argument present in the hypothesis. The survey questions in the questionnaire template covered different aspects of impacts of BI adoptions based on the Banking concept.

Analysis of Data

The study employed statistical and logical approaches as this enable the researcher to develop a strong as well as coherent analysis of data. As a result, both secondary and primary data were easily condensed by the researcher during

the survey. The logical method was utilized to integrate the earlier studies reviewed using the survey results. Alternatively, one-way ANOVA was employed as the statistical tool to test the hypothesis and in the analysis of numeral results.

Results validity

To ascertain the validity of the data collected, the researcher contacted all participants through phone calls pages and emails three days before the researcher sent the questionnaires to them. In order to prepare participants psychological and physically about the intended survey, prior communication was necessary. Only those participants who responded and stated their willingness to participate were served with the questionnaire. This was the only assertion that these participants would provide accurate information.

Reliability and Ethical Issues

The study reliability depended on the questionnaire distributed to the participants. Prior to producing the final template for examination by the supervisor. As an individual with in-depth knowledge in the banking industry and research, the supervisor would assess the questionnaire to make sure it conformed to the required standards. The supervisor corrected some aspects of the original questionnaire to make sure that it would collect the intended information.

Results of the Study

The results are found in the study depends on 50 participants who were contacted via phone calls and emails. The survey was done two times within one-week time. However, the researcher contacted all respondents three days prior to the start of the survey. During the initial stage of the survey, 50 participants were contacted (5 top executives, 10 supervisors, and 35 other staffs). Out of this, only 5 top executives, 8 supervisors, and 30 other staffs provided quality information. Others filled incorrectly and thus discarded. The second survey comprised of 40 respondents who replied the cover letter of the researcher. Out of the participants, 4 top executives, 8 supervisors, and 18 other staffs. Out of this numbers, only 4 top executives, 8 supervisors and 34 other staffs filled in the corrected questionnaire. Just like in the initial phase, the incorrectly filled survey questionnaires were discarded.

Improved operational efficiency

The respondents were asked if the adoption of the BI technologies within their place of work has improved the operational efficiency of the organization. 100% of top executives, 87.5% of supervisors, and 83.3% of others staffs agreed that BI of technologies adoptions has improved the operational efficiency of their Banks.

Table 1a: Number of respondents who agreed/Not agreed whether BI adoption is associated with improved efficiency

Position	Agree	Not agree
Top executives	5	0
Supervisors	7	1
Other staffs	25	5

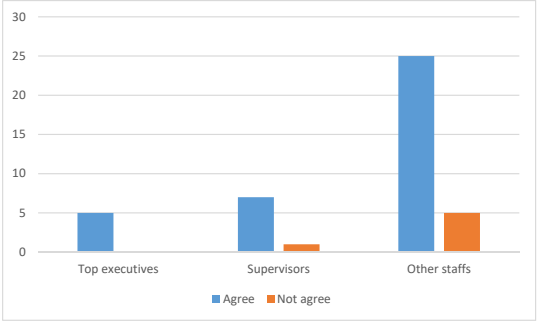

Fig 2: Graph of respondents who agreed/not agreed that BI adoption improves operational efficiency.

Table 1b: ANOVA result on responds who agreed and not agreed that BI adoption improves operational efficiency.

Agree		*Not agree*	
Mean	12.33	Mean	2
Standard Error	6.35	Standard Error	1.53
Standard Deviation	11.01	Standard Deviation	2.64
Sample Variance	121.33	Sample Variance	7
Confidence Level (95.0%)	27.36	Confidence Level (95.0%)	6.57

Improved customer retention

The respondents were ask if the adoption of the BI technologies within their place of work has improved customer retention. 100% of top executives, 87.5% of supervisors, and 83.3% of others staffs agreed that BI of technologies adoptions has improved customer retention level within their respective Banks.

Table 2a: Number of respondents who agreed/Not agreed whether BI adoption is associated with improved customer retention.

Position	Agree	Not agree
Top executives	5	0
Supervisors	7	1
Other staffs	25	5

Table 2b: ANOVA result on responds who agreed and not agreed that BI adoption improves customer retention.

Agree		*Not agree*	
Mean	12.33	Mean	2
Standard Error	6.36	Standard Error	1.53
Standard Deviation	11.01	Standard Deviation	2.64
Sample Variance	121.33	Sample Variance	7
Confidence Level (95.0%)	27.36	Confidence Level (95.0%)	6.57

Improved marketing

The respondents were ask if the adoption of the BI technologies within their place of work has improved marketing of their banks. 100% of top executives, 87.5% of supervisors, and 83.3% of others staffs agreed that BI of technologies adoptions has improved marketing of their banks.

Table 3a: Number of respondents who agreed/Not agreed whether BI adoption is associated with improved marketing

Position	Agree	Not agree
Top executives	5	0
Supervisors	7	1
Other staffs	25	5

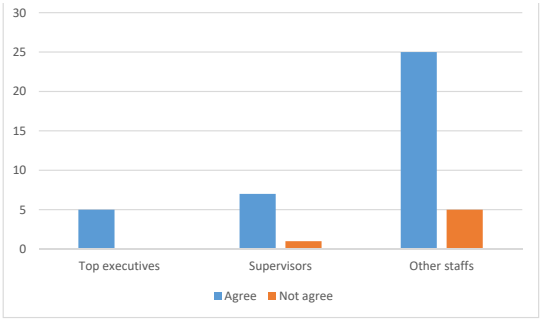

Fig 3: Graph of respondents who agreed/not agreed that BI adoption improves marketing

Table 3b: ANOVA result on responds who agreed and not agreed that BI adoption improves marketing

Agree		*Not agree*	
Mean	12.33	Mean	2
Standard Error	6.36	Standard Error	1.53
Standard Deviation	11.01	Standard Deviation	2.64
Sample Variance	121.33	Sample Variance	7
Confidence Level (95.0%)	27.36	Confidence Level (95.0%)	6.57

Risk reduction

The respondents were ask if the adoption of the BI technologies within their place of work has reduced business risks.100% of top executives, 62.5% of supervisors, and 66.7% of others staffs agreed that BI of technologies adoptions has reduced business risks of their banks.

Table 4a: Number of respondents who agreed/Not agreed whether BI adoption is associated with reduced risk

Position	Agree	Not agree
Top executives	5	0
Supervisors	5	3
Other staffs	20	10

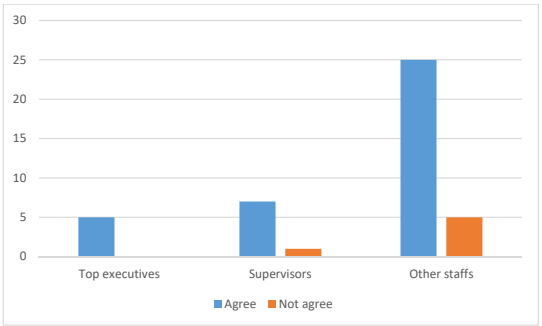

Fig 4: Graph of respondents who agreed/not agreed that BI adoption reduces risks

Table 4b: ANOVA result on responds who agreed and not agreed that BI adoption improves customer retention.

Agree		*Not agree*	
Mean	10	Mean	4.33
Standard Error	5	Standard Error	2.96
Standard Deviation	8.66	Standard Deviation	5.13
Sample Variance	75	Sample Variance	26.33
Confidence Level (95.0%)	21.51	Confidence Level (95.0%)	12.75

The respondents were asked if the adoption of the BI technologies within their place of work has reduced business risks. 100% of top executives, 62.5% of supervisors, and 66.7% of others staffs agreed that BI of technologies adoptions has reduced risk associated with the traditional methods. However, there some who believed that BI technologies adoption has resulted in their banks losing a huge sum of money through online fraudsters.

5. Study Results Analysis

ANOVA (Analysis of Variance) is a statistical descriptive tool used in research framework to test the hypothesis of the study (Ravid, 2014). It tests equality or difference between two or more population means. It examines if a difference between two or more population means is due to sampling error or the difference results from the systematic aspect. Prior to using ANOVA to determine the study hypothesis significance, it is important to revisit the hypothetical framework created to guide the study (Norris et al., 2014). The main study objective was to assess the impacts of BI adoptions by Iranian banks. Due to this, the researcher developed a null hypothesis and experimental analysis. The null hypothesis normally rejects the experimental hypothesis. According to the null hypothesis, the adoption of BI technologies by Iranian Banks has increased accounting malpractices within these banks. It is contrary to the experimental hypothesis, which proves that the adoption of BI technologies has positively affected Iranian banks in terms of efficiency and operations. This is as shown below:

Table 5a: Respondents' results on the various parameters

	Agree	Not agree
Improved operational efficiency	37	6
Improved Marketing	37	6
Reduced Risks	30	13
Improved customer retention	37	6

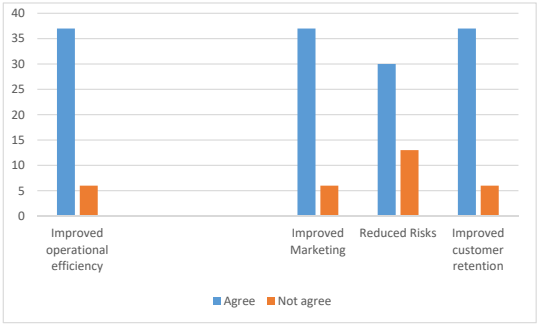

Fig 5: Respondents results on the various parameters tested

Table 5b: ANOVA results on the various parameters tested in the results

Anova: Single Factor						
SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
Agree	4	141	35.25	12.25		
Not agree	4	31	7.75	12.25		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1512.5	1	1512.5	123.47	3.17E-05	5.99
Within Groups	73.5	6	12.25			
Total	1586	7				

From the table 5b, the P-value is less than the theoretical value. It indicates the significance of the study results. In addition, it supports the knowledge that the adoptions of BI technologies by Iranian Banking industry has affected them positively. Since F> F crit we reject the null hypothesis (Rojewski, 2012). It implies that the adoption of BI technologies by Iranian Banks has affected them positively. Thus, the study created a significance base for further study about of BI technologies adoption affects various aspects of the banking sector. The result proves that the adoption of BI technologies by Iranian Banks has improved operational efficiency, improved customer retention, improved market, and reduced risks. However, further study needs to be conducted to investigate the extent to which the BI technologies can be used by rogue staffs to loot money from these banks.

6. Discussion

According to Kao et al. (2016,) organizations that have adopted the BI technologies have recorded improved operational efficiency. This was also true according to the research findings. Significant staffs within the Iran Banking agreed to this fact. In this modern ultra-competitive global market, financial institutions such as banking sector should be as lean and efficient as possible (Fourati-Jamoussi & Niamba, 2016). It has been proven by other researchers that an organization that uses BI solutions to analyze operational process can reduce current expenses as well as maximize the existing expertise and resources (Fotache, 2016). In addition, the adoption of BI technologies by the Iranian Banks has enabled them to improve their services.

BI solutions normally has enabled organizations to track individual revenue stream to establish the types of services that profitable and those that are not. Most of the staffs interviewed agree that since their respective banks adopted the BI technologies the popularity of these banks has increased significantly (Cristescu, 2016). Using Business intelligence, marketers can easily analyze CRM data depending on different criteria to unveil the most profitable client profile (Kowalczyk & Buxmann, 2015). Besides, the client base can be explored to identify and establish new cross-sell as well as up-sell opportunities and to conduct more targeted marketing campaigns online. Most of the BI technologies enable organizations to identify as well as pursue the most profitable customers (Kowalczyk & Buxmann, 2015). The study revealed that there are improved customer retention and loyalty among Iranian banks that have adopted BI. Using business analytics techniques and tools, organizations can discern the reasons why clients switch to a competition organization.

7. Conclusion and recommendation

The study successfully showed that the adoption of BI technologies by Iranian Banks has affected these financial institutions in a more positive way than in a negative way. BI adoption is associated with improved organizational operations as well as improved marketing. Besides the study successfully proved that the adoption of BI by Iranian banks improved their customer retention and reduced organizational risks. However, at some instances, some fraudsters and rogue managers and employees have exploited the flaws within BI technologies to steal from these banks. Nearly all the participants agree that BI technologies adoptions have brought many goodies within their banking institutions.

The recommendation is that Iranian Banks should come up with a mechanism that can address the shortcomings associated with BI solutions. Since technology, is ever changing and hackers and fraudsters are becoming smarter than one can imagine, measures should be put in place so that that they can exploit BI technologies to steal from these banks.

REFERENCES

[1] Caia, F., and Nastase, P. (2015). Modeling a Business Intelligence System for Investment Projects. Economic Computation & Economic Cybernetics Studies & Research, 49(2), 1-24.

[2] Chen, H., Chiang, R. H., and Storey, V. C. (2012). Business Intelligence and Analytics: From Big Data to Big Impact. MIS quarterly, 36(4), 1165-1188.

[3] Chung-kuang, H. (2014). User acceptance of business intelligence systems in Taiwan's electronics industry. Social Behavior & Personality: An International Journal, 42(4), 583-596. doi:10.2224/sbp.2014.42.4.583

[4] Cristescu, M. P. (2016). Traditional Enterprise

Business Intelligence Software Compared to Software as a Service Business Intelligence. Informatica Economica, 20(1), 39-47. doi:10.12948/issn14531305/20.1.2016.04

[5] Elbashir, M. Z., Collier, P. A., and Davern, M. J. (2014). Measuring the effects of business intelligence systems: The relationship between business process and organizational performance. International Journal of Accounting Information Systems, 9(3), 135-153.

[6] Elbashir, M. Z., Collier, P. A., Sutton, S. G., Davern, M. J., and Leech, S. A. (2013). Enhancing the Business Value of Business Intelligence: The Role of Shared Knowledge and Assimilation. Journal Of Information Systems, 27(2), 87-105. doi:10.2308/isys-50563

[7] Fotache, M. (2016). Data Processing Languages for Business Intelligence. SQL vs. R. Informatica Economica, 20(1), 48-61. doi:10.12948/issn14531305/20.1.2016.05.

[8] Fourati-Jamoussi, F., and Niamba, C. N. (2016). An evaluation of business intelligence tools: a cluster analysis of users' perceptions. Journal Of Intelligence Studies In Business, 6(1), 37-47.

[9] Gross, A., and Solymossy, E. (2016). Generations of Business Information, 1937-2012: Moving from Data Bits to Intelligence. Information & Culture, 51(2), 226-248. doi:10.7560/IC51204

[10] Han, Y., Shen, C., and Farn, C. (2016). Determinants of continued usage of pervasive business intelligence systems. Information Development, 32(3), 424-439. doi:10.1177/0266666914554811

[11] Kao, H. h., Yu, M. y., Masud, M. m., Wu, W. w., Chen, L. l., and Wu, Y. w. (2016). Design and evaluation of hospital-based business intelligence system (HBIS): A foundation for design science research methodology. Computers In Human Behavior, 62495-505.

[12] Kowalczyk, M., and Buxmann, P. (2015). An ambidextrous perspective on business intelligence and analytics support in decision processes: Insights from a multiple case study. Decision Support Systems, 801-13. doi:10.1016/j.dss.2015.08.010

[13] Norris, G., Qureshi, F., and Howitt, D. (2014). Introduction to Statistics with SPSS for Social Science. Florence: Taylor and Francis.

[14] Peters, M. D., Wieder, B., Sutton, S. G., and Wakefield, J. (2016). Business intelligence systems use in performance measurement capabilities: Implications for enhanced competitive advantage. International Journal Of Accounting Information Systems, 211-17. doi:10.1016/j.accinf.2016.03.001

[15] Ravid, R. (2014). Practical statistics for educators. Lanham, Md: Rowman and Littlefield.

[16] Rojewski, J. r., In Heok Lee1, i., and Gemici, S. S. (2012). Use of t-test and ANOVA in Career-Technical Education Research. Career & Technical Education Research, 37(3), 263-275.

[17] Rouhani, S., Ashrafi, A., Zare Ravasan, A., and Afshari, S. (2016). The impact model of business intelligence on decision support and organizational benefits. Journal Of Enterprise Information Management, 29(1), 19-50. doi:10.1108/JEIM-12-2014-0126

[18] Rud, O. P. (2009). Business intelligence success factors: tools for aligning your business in the global economy (Vol. 18). John Wiley & Sons.

[19] Scholz, P., Schieder, C., Kurze, C., Gluchowski, P., and Böhringer, M. (2013. Benefits and Challenges of Business Intelligence Adoption in Small and Medium-Sized Enterprises. In ECIS.

[20] Schulz, M., Winter, P., and Choi, S. T. (2015). On the relevance of reports—Integrating an automated archiving component into a business intelligence system. International Journal Of Information Management, 35(6), 662-671. doi:10.1016/j.ijinfomgt.2015.07.005.

[21] Sharifi-Renani, H., Moshref-Javadi, M. H., and Hajipoor, M. (2014). The Role of Information Technology in Reduction of Administrative Corruption through Increasing of Information transparency, Improvement of Accountability and Promotion of Integrity; A Case Study of Saderat Bank Branches in Isfahan. Journal Of Information Processing & Management, 28(3), 659-679.

[22] Shollo, A., and Galliers, R. D. (2016). Towards an understanding of the role of business intelligence systems in organisational knowing. Information Systems Journal, 26(4), 339-367. doi:10.1111/isj.12071

[23] Taghavifard, M. T., Adib, M. Z., and Torabi, M. (2012). Effective Factors on the Use of Internet Banking Services by Customers (Case: Mellat Bank). Journal Of Information Processing & Management, 27(3), 539-559.

[24] Tavallaei, R., Shokohyar, S., Moosavi, S. M., and Sarfi, Z. (2015). Assessing the Evaluation Models of Business Intelligence Maturity and Presenting an Optimized Model. International Journal Of Management, Accounting & Economics, 2(9), 1005-1019.

[25] Tvrdíková, M. (2016). Increasing the business potential of companies by ensuring continuity of the development of their information systems by current information technologies. Journal Of Business Economics & Management, 17(3), 475-489. doi:10.3846/16111699.2013.839475

[26] Wang, H. (2014). Distinguishing the adoption of business intelligence systems from their implementation: the role of managers' personality profiles. Behaviour & Information Technology, 33(10), 1082-1092. doi:10.1080/0144929X.2013.869260

[27] Williams, S., and Williams, N. (2013). The profit impact of business intelligence. Morgan Kaufmann.